

- 32 -

C L A I M S

- 5 1. A carcass structure for vehicle wheel tyres comprising:
- at least one carcass ply (3) comprising thread-like elements (14) substantially disposed transversely of a circumferential extension of the carcass structure (2);
 - at least one pair of annular reinforcing structures (4) disposed close to respective inner circumferential edges of the carcass ply (3), each of said annular reinforcing structures (4) comprising:
 - 10 - at least one first circumferentially-inextensible annular insert (26) substantially in the form of a crown disposed substantially coaxially of the carcass structure (2), close to an inner circumferential edge of the carcass ply (3), said first annular insert (26) being formed of at least one elongated element extending in concentric coils (26a, 26b);
 - 20 - at least one second circumferentially-inextensible annular insert (30) substantially in the form of a crown disposed coaxially of the tyre, said second annular insert (30) being formed of at least one elongated element extending in concentric coils (30a), characterized in that said carcass ply (3) has end flaps (25a) each turned back around an inner circumferential edge of the respective first annular insert (26) and each axially interposed between the respective first and second annular inserts (26, 30).
- 30 2. A carcass structure as claimed in claim 1, further comprising at least one filling body (31) of elastomer material in contact with at least one of said inextensible annular inserts (26, 30).
- 35 3. A carcass structure as claimed in claim 2, wherein the second inextensible annular insert (30) is interposed

- 33 -

5 between the respective end flap (25a) and the filling body (31), said second inextensible annular insert (30) being in contact with the end flap (25a) on the opposite side relative to the first inextensible annular insert (26).

10 4. A carcass structure as claimed in claim 1, wherein the end flap (25a) of the carcass ply (3) completely covers the respective first inextensible annular insert (26).

15 5. A carcass structure as claimed in claim 1, wherein the second inextensible annular insert (30) projects beyond one end region of the respective end flap (25a).

20 6. A carcass structure as claimed in claim 1, wherein each second inextensible annular insert (30) projects beyond an outer circumferential edge of the first inextensible annular insert (26).

25 7. A carcass structure as claimed in claim 1, wherein the first inextensible annular insert (26) comprises at least one first series of concentric coaxial coils (26a) and one second series of concentric coaxial coils (26b) disposed in axial side by side relationship with the coils (26a) of the first series.

30 8. A carcass structure as claimed in claim 7, wherein the number of coils (26a) of the first series is greater than the number of coils (26b) of the second series.

35 9. A carcass structure as claimed in claim 8, wherein said first coil series (26a) is directly in contact with the carcass ply (3), whereas the second coil series (26b) is directly in contact with the respective end flap.

- 5 10. A carcass structure as claimed in claim 1, wherein the first inextensible annular insert (26) projects beyond one end region of the respective end flap (25a).
- 10 11. A carcass structure as claimed in claim 1, wherein the first inextensible annular insert (26) projects beyond an outer circumferential edge of the respective second inextensible annular insert (30).
- 15 12. A carcass structure as claimed in claim 2, wherein the filling body (31) is interposed between the respective end flap (25a) of the carcass ply (3) and the respective second annular insert (30).
- 20 13. A carcass structure as claimed in claim 12, wherein the second annular insert (30) is directly in contact with at least one axially outer side surface of the respective filling body (31), located on the opposite side relative to the end flap (25a) of the carcass ply (3).
- 25 14. A carcass structure as claimed in claim 1, wherein the filling body (31) has a circumferentially outer portion directly in contact with a side surface of the carcass ply (3).
- 30 15. A carcass structure as claimed in claim 1, wherein said at least one carcass ply (3) comprises:
- a plurality of strip-like sections (13) each comprising at least two of said thread-like elements (14) disposed longitudinally and parallelly of each other and at least partly covered with at least one layer of raw elastomer material (17),
- each of said strip-like sections (13) extending in a
35 substantially U-shaped configuration according to a cross section outline of the carcass structure (2), to define

- 35 -

SUB
A7

two side portions (25) substantially extending in planes orthogonal to a geometric axis of the carcass structure itself at mutually spaced apart positions in an axial direction, and a crown portion (24) extending at a radially outer position between the side portions (25); - said crown portions (24) being disposed in side by side relationship with each other along the circumferential extension of the carcass structure (2), whereas the side portions (25) of each strip-like section (13) are each partly covered with a side portion (25) of at least one adjoining strip-like section (13).

16. A carcass structure as claimed in claim 15, wherein the side portions (25) of said strip-like sections (13) mutually converge towards the geometric axis of the carcass structure (2), the covering of the side portions (25) of the strip-like sections (13) progressively increasing in the direction of the inner circumferential edge of the carcass ply (3) starting from a zero value close to transition regions between said side portions (25) and said crown portions (24).

17. A method of manufacturing a carcass structure for vehicle wheel tyres, comprising the steps of:

- making a carcass ply (3) having a pair of end flaps (25a) disposed circumferentially internally;
- applying at least one annular reinforcing structure (4) close to each end flap (25a) of the carcass ply (3); characterized in that each annular reinforcing structure (4) is formed by the following steps:
 - applying at least one first inextensible annular insert (26) close to the respective end flap (25a) of the carcass ply (3), said first inextensible annular insert (26) being formed of at least one first elongated element disposed in concentric coils (26a, 26b);
 - turning back the end flap (25a) of the carcass ply (3)

- 36 -

5 SUB
a7
around an inner circumferential edge of the first annular insert (26);

- applying at least one second inextensible annular insert (30) close to the first annular insert (26), said second inextensible annular insert (30) being formed of at least one second elongated element disposed in concentric coils (30a).

10 18. A method as claimed in claim 17, further comprising the step of applying at least one filling body (31) of elastomer material in contact with at least one of said annular inserts (26, 30).

15 19. A method as claimed in claim 17, wherein at least one of said first and second inextensible annular inserts (26, 30) is formed by winding up a continuous elongated element in radially-superposed concentric coils (26a, 26b, 30a).

20 20. A method as claimed in claim 17, wherein at least one of said first and second inextensible annular inserts (26, 30) is formed directly against the carcass ply (3).

25 21. A method as claimed in claim 17, wherein at least one of said first and second annular inserts (26, 30) is formed in a forming die (27), said forming die (27) being subsequently moved against the carcass ply (3) for application of the inextensible annular insert (26, 30).

30 22. A method as claimed in claim 17, wherein said turning-back of the end flap (25a) comprises the following steps:

- axially pushing the end flap (25a) for moving it from a first position in which it projects radially inwardly relative to the first inextensible annular insert (26)
35 to a second position in which it is axially oriented away

- 37 -

SUB
C7

from an equatorial plane of the carcass structure;
- exerting a rolling action on the end flap (25a) for laterally applying it against the first inextensible annular insert (26).

5

23. A method as claimed in claim 18, wherein application of the filling body (31) comprises the steps of:

- making said filling body (31) in a forming die (32);
- axially moving the forming die (32) against the carcass

10 structure (2).

24. A method as claimed in claim 23, further comprising a step of coupling the filling body (31) with the second inextensible annular insert (30) in the forming die (32),

15 before the simultaneous application of the filling body (31) and the second inextensible annular insert (30) against the carcass structure (2).

25. A method as claimed in claim 17, wherein application of the filling body (31) is carried out by forming the filling body (31) directly against the carcass structure (2).

20

26. A method as claimed in claim 25, wherein said formation of the filling body (31) against the carcass structure (2) takes place by extrusion of at least one continuous strip-like element wound up in superposed coils.

25

27. A method as claimed in claim 17, wherein manufacturing of the carcass ply (3) comprises the following steps:

- preparing strip-like sections (13) each comprising longitudinal and parallel thread-like elements (14) at least partly coated with one layer of raw elastomer material (17);

30
35

- 38 -

- 5 - depositing each of the strip-like sections (13) onto a toroidal support (11) in a substantially U-shaped conformation around the cross section outline of the toroidal support, to define two side portions (25) substantially extending in planes orthogonal to a geometric axis of rotation of the toroidal support (11) at mutually spaced apart positions in an axial direction, and a crown portion (24) extending at a radially outer position between the side portions (25);
- 10 - in which the crown portions (24) of each strip-like section (13) are consecutively disposed in side by side relationship along the circumferential extension of the toroidal support (11), whereas the side portions (25) of each strip-like section (13) are each partly covered with
- 15 a side portion (25) of at least one circumferentially consecutive section.

28. A method as claimed in claim 27, wherein the side portions (25) belonging to circumferentially contiguous strip-like sections (13) on the toroidal support (11) are caused to mutually converge in the direction of the geometric rotation axis of the toroidal support itself, the covering of the side portions (25) of each strip-like section (13) progressively increasing in the direction of

25 the inner circumferential edge of the carcass ply (3) starting from a zero value close to transition regions between said side portions (25) and said crown portions (24).

30 29. A method as claimed in claim 27, wherein the strip-like sections (13) are laid down by making the side portions (25) of each strip-like section (13) project from an inner circumferential edge (11a) of the toroidal support (11), the projecting ends of the side portions

35 defining the end flaps (25a) of said carcass ply (3).

add a8

en5 a67